CHECKLIST ENVIRONMENTAL ASSESSMENT

COMPANY NAME: BMP Investments, Inc. **Project:** Bull Mountains Mine No. 1

OPERATING PERMIT #: 93017

LOCATION: Township 6N, Range 27E, all or portions of Sections 20, 28, 29, 30, 32, 33, and 34 (approximately 2,172 acres)

Counties: Musselshell County and Yellowstone County

PROPERTY OWNERSHIP: [ ] Federal [ ] State [x] Private

TYPE AND PURPOSE OF ACTION:

BMP Investments, Inc. (BMPII) has applied for an amendment to the Bull Mountains Mine No. 1. The proposed permit amendment would expand the underground mine plan, and modify the method of longwall mining. The proposed permit amendment does not address any additions to the mine facilities area; however, it does address a stepped approach to the development of the mine waste disposal area. Further revisions to SMP 93017 are planned with Application 00176, Major Revision addressing changes to the rail loop, a minor revision updating the mine facilities, and a minor revision updating the mine permit to delete antiquated references, update rule citations, and clean-up permit language.

MINING AND ENGINEERING

Coal Reserves and Amended Area

BMPII proposes to amend approximately 2172 acres to the permit area of the Bull Mountains Mine, No. 1, south of Roundup, Montana. The amendment adds about 23.5 million tons of in-place-coal reserves to the existing permit area, for a total of approximately 39.5 million tons of in-place-coal. Approximately 26.9 million tons of the in-place reserves are recoverable. Annual production would increase over the first five years to 11 million tons/year. All extracted coal would be from the Mammoth Coal Seam.

Mining Method and Mine Plan

Coal at Bull Mountains Mine No. 1 would be recovered using mechanical underground mining methods, including continuous mining and longwall mining. Subsidence is planned to occur over the mined-out longwall panels. No blasting will be conducted at the mine site without a revision to SMP 93017.

Continuous mining would involve cutting entries (mine tunnels) approximately 8 to 10 feet high by about 20 feet wide. Several parallel entries are intersected by regularly spaced tunnels called crosscuts. The unmined areas between the entries and crosscuts are called pillars, and are the primary means of supporting the mine openings. This method of mining is referred to as “room-and-pillar mining.” Continuous mining would be used primarily for developing entries necessary for transportation, ventilation, utilities, and access to longwall panels.

Longwall mining requires a significant amount of up-front preparation, or “development” mining. In order to supply the mine with power, water, air, and safe transportation corridors, a set of entries must be established. These main entries, or “mains,” are designed to remain intact for the life of mine, and are driven using

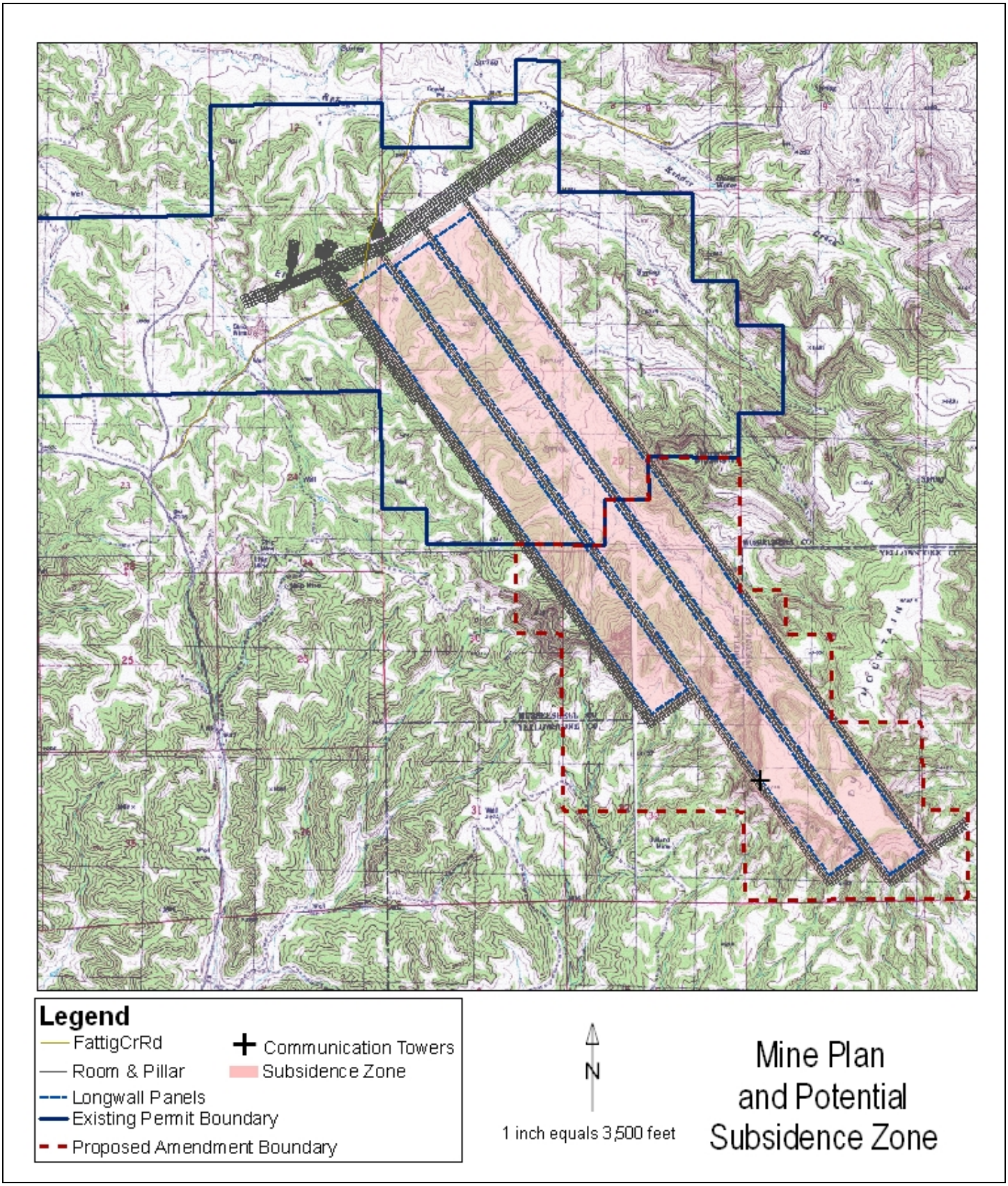

Figure 1. Mine Plan and Potential Subsidence Zone

continuous miners. The mains at the Bull Mountains Mine provide transportation for workers, equipment, and coal, and consist of five to seven parallel entries. Access to the various longwall panels would be established from the mains.

Continuous mining would establish the entries leading to the longwall panels, called "gateroads." The gateroads are driven roughly perpendicular to the mains, and consist of three parallel entries. Besides providing worker access to the longwall panels, gateroads play a vital role in longwall equipment installation, ventilation of the working area, and transportation needs. Once gateroads have been developed around a panel, the longwall equipment can be installed. Application 00178 allows BMPII to extract coal from three longwall panels. The proposed mine plan is shown in Figure 1.

Longwall mining is a method by which all of the coal is completely removed from each longwall panel, effectively achieving 100% coal extraction. The complete extraction of the coal in each longwall panel causes subsidence on the surface, which is discussed in detail below. Longwall mining utilizes a series of hydraulic supports, or shields, set up along the longwall face (see Figure 2). These shields function as temporary support for the mine opening and prevent caving at the longwall face, protecting workers and equipment. A cutting machine called a shearer moves back and forth along the line of shields, cutting the coal in a series of passes. Mining advances perpendicular to the direction of shearer movement. After the shearer completes a pass the entire system (shields, shearer, and face conveyor) moves forward.

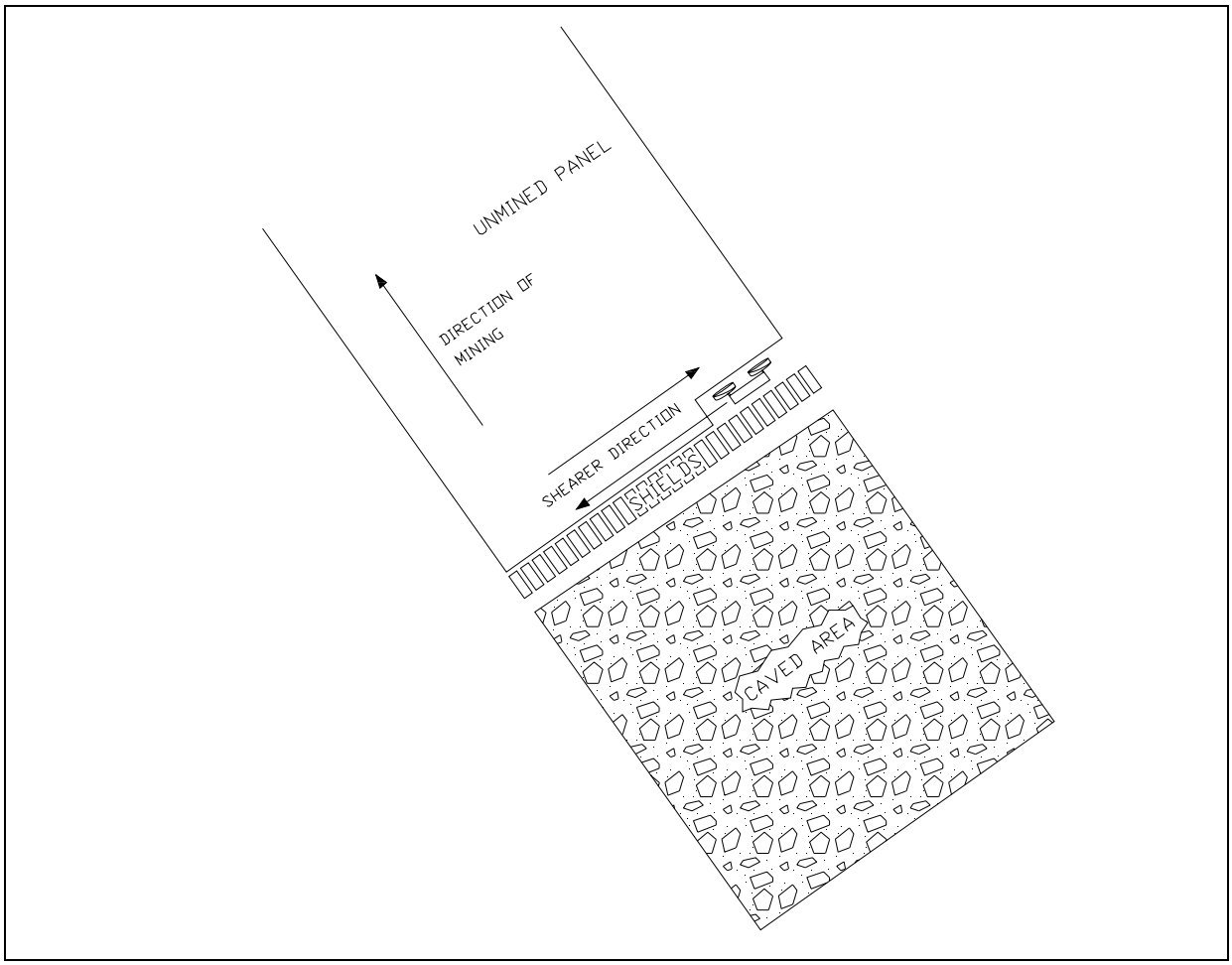

Figure 2. Longwall Mining Schematic

At full production during the next five years, BMPII is planning on mining longwall panels at a rate of 11,000,000 tons/year. This number equates to the longwall face advancing roughly 55 ft/day. Initial production rates would be less. Because each gateroad is designed to stay open for the first panel, but to yield as the panel on the second side of it is mined-out, mining out of sequence would limit access to some panels, causing failure to conserve coal. It is, therefore, imperative that panels be mined in sequential order.

Due to a drafting oversight during the amendment application process, the proposed amendment boundary is located, such that BMPII would be precluded from mining the third longwall panel. Headgate development for the third longwall panel could not be completed until another amendment has been submitted and approved. Application 00178 has been evaluated based on the assumption that three longwall panels would be developed and mined. The amount of area that BMPII would need to amend to the permit to mine the third longwall panel is approximately four acres. It is anticipated that BMPII will either submit an application to amend this small area into SMP 93017, or include the area in a larger, anticipated future amendment.

Subsidence

Each of the first three longwall panels at the Bull Mountains Mine No. 1 consists of a large block of coal, approximately 1250 feet wide by approximately 15,000 to 23,300 feet long (Figure 1). The panels would be completely extracted, resulting in caving in these areas. Once the coal has been removed and the shields have advanced, the opening would be unsupported, causing overlying rock strata to collapse into the void. As subsequent rock strata above the mine cave in, the disturbance eventually propagates to the surface in the form of subsidence, or surface depression. The mined-out areas cave in behind the longwall system as it advances along the length of the panel. Collapse of the roof over the longwall panel would cause the surface overlying the panel to subside by an amount somewhat less than the thickness of the coal seam. Subsidence in the Bull Mountains has been predicted to be about 70% of the extraction height (Agapito, 1990). The Mammoth Coal ranges in height from 8 to 11 feet in the permit area. Subsidence is expected to range up to approximately 7.7 feet.

The proposed amendment includes decreasing the surface effects of longwall mining, to the extent possible, by increasing the size of the longwall panels and refining the previously permitted mine design. Increasing the size of the longwall panels causes more uniform surface subsidence over larger areas. From an environmental regulatory standpoint, this revision is an improvement over the previous mine plan in that, surface effects would be fewer and more spread apart.

The pillars supporting the gateroad openings have been redesigned to slowly fail as the longwall panel progresses. Failure of the gateroad pillars would result in partial subsidence over the gateroads. In longwall mining, surface subsidence typically occurs as a series of troughs over the longwall panels. But because the

gateroads are designed to yield under the stress of the mined-out panels, the expected result is less extreme transitions between each trough. The expected outcome is that the surface subsidence would be more uniform and less surface cracking would occur.

Potential for Subsidence-Related Damage to Land and Structures

Communication towers are located on Dunn Mountain (see Figure 1). The towers are used for both industrial purposes and emergency communications, and are located at NW1/4, Section 33, T6N, R27E. The site lies directly over the second longwall panel and is expected to subside approximately six to seven feet, based on its location over the coal seam and the proposed mine plan. Damage to structures must be mitigated, to the extent

possible. A stipulation, requiring a protection/mitigation plan must be submitted prior to January 1, 2007, and approved prior to initiation of longwall mining, would be placed on the approval of the amendment.

Other subsidence-related damage is expected to be minimal. Surface cracking is expected in some areas. Minor damage to roads and fences is possible. State regulations require the mine operator to promptly repair damage to private property. Steep slopes in the area may be prone to rockslides during subsidence. Landowners must be provided with a schedule at least 6 months prior to their property being undermined. The schedule must contain enough information to enable landowners to move cattle to safe areas, and to avoid hazardous areas while mining is taking place.

Subsidence could also negatively impact springs, wells, and stream courses. These potential impacts are further discussed in the surface water and ground water sections below.

Bond

The bond has been divided into three increments. The first increment, Phase I, applies to pre-existing disturbance at the Bull Mountains Mine No. 1, as well as items associated with mining of the proposed amendment area. This includes all current surface disturbance, as well as underground equipment retrieval (does not include the longwall – see Phase III discussion below), existing facilities, post-operational monitoring, and the waste disposal area. For the purposes of the amended permit, the waste disposal area would be bonded for partial capacity. Until additional bond (above the amount included in Phase 1) is submitted, BMPII would not be allowed to fill their waste disposal area beyond the elevation at which 85 acres worth of reclamation work is required (soiling and seeding).

The second portion of the bond, Phase II, covers the proposed new facilities and coal processing plant. This amount is subject to increase with the addition of the new rail loop. Upon the approval of future revisions to the mine facilities and rail loop, the calculations for this portion of the bond would be updated. BMPII must be fully bonded for this phase of their bond prior to any surface disturbance related to construction of the new facilities or rail loop.

The third and final increment of the bond, Phase III, pertains specifically to the initiation of longwall mining and its surface effects. Phase III covers longwall equipment removal. An initial contingency for repair of surface facilities (e.g. roads, wells, springs, fences, etc.) has been included in the bond calculation. Regulations require the Department to increase the bond as subsidence related damage occurs and repairs are planned and implemented.

The total Phase I bond amount is $6,154,588. The bond totals for Phases 2 and 3 have been estimated; however, they would be reevaluated with subsequent revisions (e.g. Application 00176, rail loop).

Surface Water Environmental Assessment

BMPII has submitted an amendment to the existing permit to expand the mine southeastwards. The amendment would add about 2,172 acres. Included in this area are six springs and two ponds. Other springs and ponds are near the proposed amendment boundary and may also be impacted (Figure 3).

Surface water monitoring began in earnest in 1989 with the original permit applicant (Meridian Minerals) and discontinued in 1997. Monitoring partially resumed in 2003 and was fully resumed in 2004 when BMPII assumed the surface mining permit. From data gathered during these two time periods it is evident that lack of precipitation has had an overwhelming affect on springs, ponds and what were termed stream reaches.

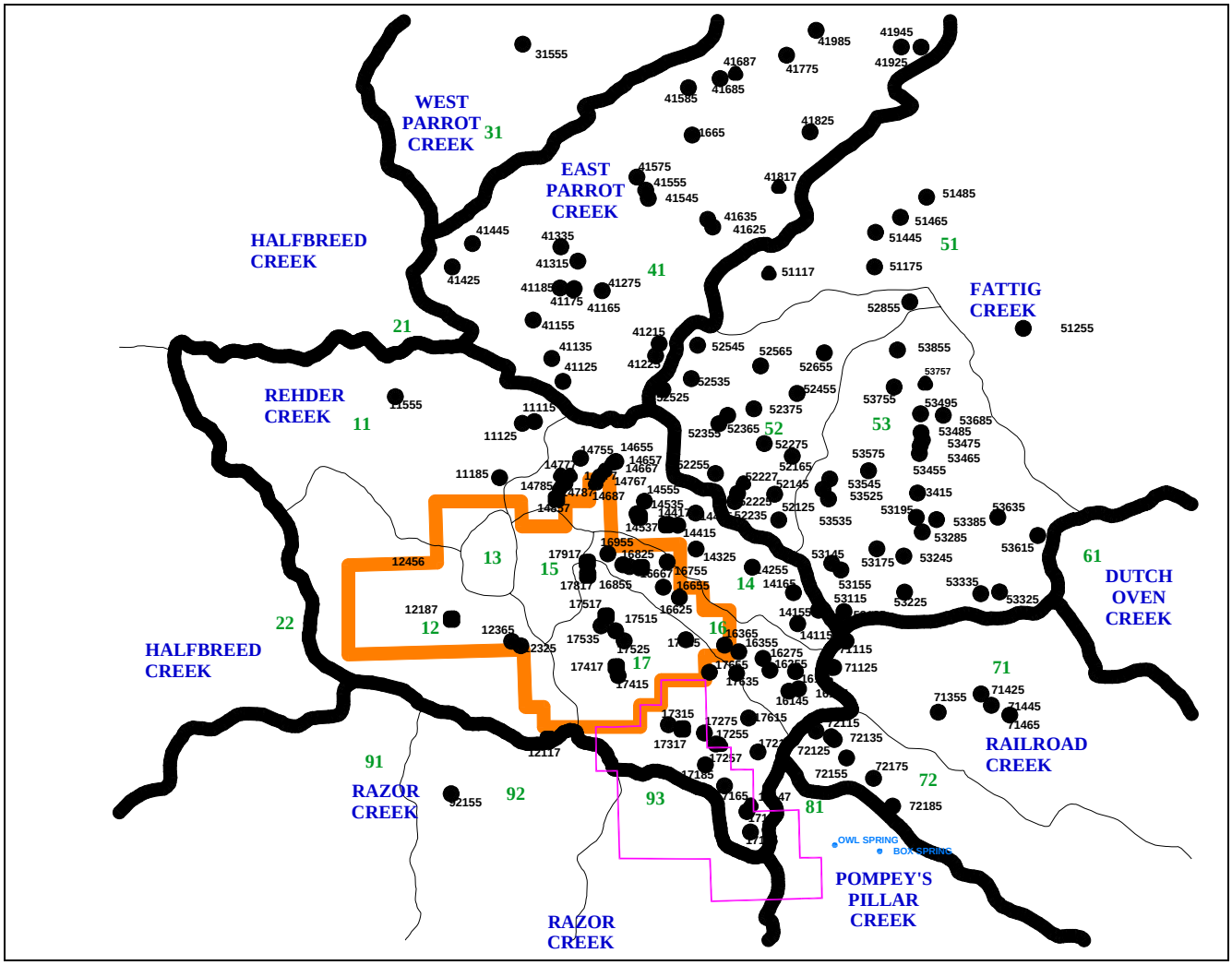

Figure 3. Surface Water Assessment

Precipitation data for Roundup, Montana, about 15 miles north of the mine, indicate an average precipitation of 12.34 inches per year from 1914 to 2005. During the first period of monitoring (1989 through 1996) precipitation averaged 15.26 inches (2.92 inches above normal), while during 2003 it was 8.29 inches (4.05 inches below average) and in 2004 it was 9.97 inches (2.37 inches below average). During the period of 1997 through 2003 the average precipitation was 9.28 inches (3.06 inches below average). In 2005 the precipitation was 17.79 inches, 5.45 inches above normal (Figure 4).

The first period of monitoring for springs, ponds and streams reflects the above normal precipitation just as the second period of monitoring reflects the below average precipitation for the area. As a way of analyzing data from the various monitoring sites the information was grouped in a number of ways.

Data was grouped by subdrainages. Only those springs that actually had flow sometime during the first period of monitoring (1989 through 1996) were kept in the data set. The average flow for each subdrainage that had a flowing spring was then determined. The average flow during the second period of monitoring (2004 and 2005) for these same sites was then determined.

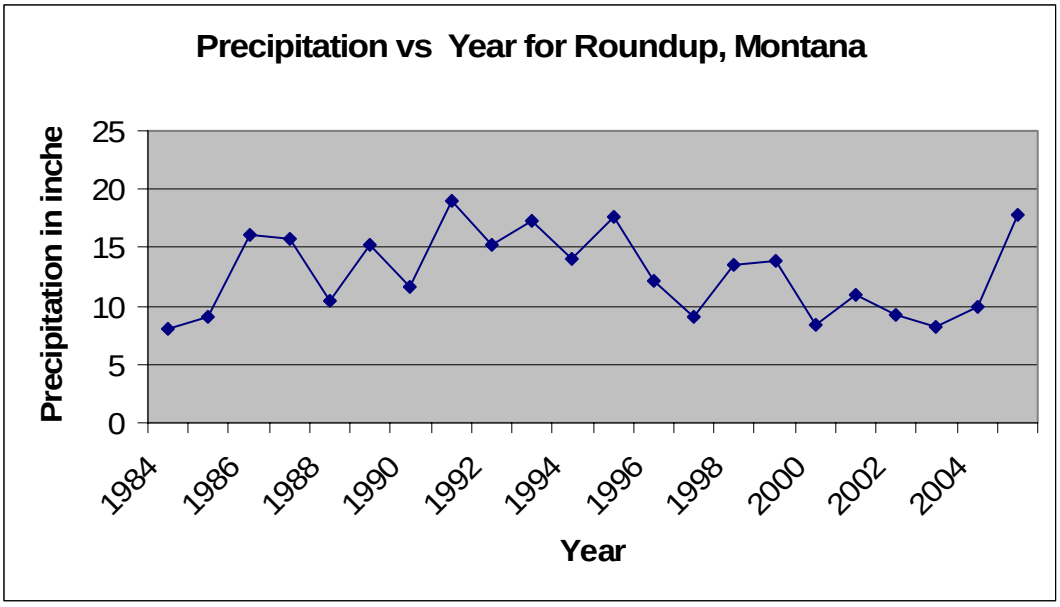

Figure 4. Precipitation for Roundup Montana for 1984 through 2005

The data indicate that spring flow in all of the subdrainages was severely impacted by subnormal precipitation that began in 2000 and continued through year 2004. Almost all of the springs that flowed during the early monitoring period went dry during the later period. The overall flow for each of the subdrainages shows decreases ranging from an 84% reduction in flow up to a 100% reduction of flow. The impact of the drought has been severe and widespread across all of the subdrainages in the monitoring program, which covers approximately 80 square miles. Of the 138 springs being monitored only 12 exhibited any flow in 2004. The springs exhibited some flow recovery in 2005, with 18 springs having some flow.

Additionally, the locally named springs were reviewed to better understand the affects of drought on larger water features. Ten springs in the water resource study area are known by local names. Only three of these springs continued to have flow in 2004 (Dunn Corner Spring, Bull Spring and Lower Railroad Creek Spring). Dunn Corner Spring is located in the Life of Mine (LOM) area (e.g. current permit area plus the amendment area), Bull Spring is in the proposed amendment area and Lower Railroad Creek Spring is southeast of the LOM area. Five springs had flow in 2005 (Dunn Corner Spring, Cold Water Spring, Bull Spring, Spring Below Cliff and Lower Railroad Creek Spring).

In addition to the named springs there are other important springs in the study area. All but two of these nine springs show large decreases in flow from the first monitoring period to 2004. The exceptions are Spring 16755 which actually showed an increase in flow (19%) and Spring 72125 which had only a minor reduction in flow (4.8%). Spring 16755 is located in the current permit area and Spring 72125 is located east of the proposed LOM. In 2005 most of the springs showed a large increase in flow, although still less than what existed during the first monitoring period. Spring 16755 continued to show an increase in flow while Spring 72125 had almost no change from 2004.

In an effort to separate out the more important springs from those that may simply have shown some flow in the first monitoring period, Table 1 was developed. The table is composed of named springs in the permit or proposed amendment area, as well as, those springs that have shown flow during both monitoring periods and are located in the permit or amendment area. In addition, the table indicates predicted impacts to these springs and overburden thickness.

Table 1. Named Springs that Flowed in the Permit or Proposed Amendment Area and Unnamed Springs that

Flowed during both Monitoring Periods

Spring	Location	Current Status (2004)	Current Status (2005)	Predicted Impacts from Mining[1]	Overburden Thickness[2]
16365	Permit Area.	1.98 gpm	12.5 gpm	Moderate Potential.	406 feet.
Cold Water Spring (16655)	Permit Area.	Dry.	3.0 gpm	Moderate Potential.	273 feet.
16755	Permit Area.	1.0 gpm	1.5 gpm	High Potential.	400 feet.
Bull Spring (17145)	Proposed Amendment Area.	0.31 gpm	1.81 gpm	Moderate Potential.	620 feet.
17185	Proposed Amendment Area.	0.30 gpm	1.79 gpm	Moderate Potential.	275 feet.
17275	Proposed Amendment Area.	0.41 gpm	1.5 gpm	Low Potential.	??
Litsky Spring (17415)	Permit Area.	Dry/ponded	Dry.	Low Potential.	205 feet.

1. Prediction of impacts taken from amendment submittal, Appendix 314-2.

2. Depth of overburden taken from amendment submittal, Appendix 314-2.

Seven springs are listed in Table 1. Two of these springs were dry or ponded in 2004 while only one spring was dry in 2005. Two springs show a low potential for impacts due to mining; one in the proposed amendment area (Spring 17275) and one in the permit area (Spring 17415).

Due to the unpredictability of determining actual impacts to springs one of the more important criteria is listed, thickness of overburden. Subsidence from longwall mining is expected to create a fracture zone 300 to 400 feet above the mine void, or 30 to 50 times the seam height (Meridian Written Findings, 1993). Monitoring of these seven springs would be of particular importance in determining actual impacts and implementing mitigation measures if such impacts occur.

The monitoring program also included perennial and intermittent ponds. The data from these ponds was also grouped by subdrainage (Table 2). Subdrainages that did not have perennial or intermittent ponds, or had ponds that were dry during the first period of monitoring were excluded from the data set. The average depth of water in the ponds was determined, as well as, the average flow if it occurred. A comparison was then made with the second period of monitoring (2004 and 2005).

Table 2. Perennial/Intermittent Pond Data Comparison between the First and Second Period of Monitoring[1]

Subdrainage	Number of Ponds in Data Set.	Average Depth for 1989-1996 (feet) and Flow (gpm)[2]	Average Depth for 2004 (feet) and Flow (gpm)[2]	Change in Condition	Average Depth for 2005 (feet) and flow (gpm)[2]	Comments
12	2	2.73 feet Ponded, no flow.	1 pond, dry. 1 pond, ponded.	Change to dry.	1 pond, dry. 1 pond , no access.	
14	7	2.58 feet	7 ponds, dry.	Change to dry.	7 ponds, dry.	Flow data based on the three

		2.22 gpm				ponds that flowed in 1989-1996.
16	1	2.71 feet 2.89 gpm	1 pond, dry.	Change to dry.	Dry.	
17	3	2.37 feet 2.11gpm	3 ponds, dry.	Change to dry.	3 ponds, dry.	
22	1	1.34 feet Ponded/no flow.	Dry.	Change to dry.	1 pond, dry.	
41	1	0.59 feet Ponded/no flow.	1 pond, dry.	Change to dry.	1 pond, dry.	One pond was dry and so not included in the data set.
52	1	2.58 feet 1.32 gpm	1 pond, ponded.	Change to ponded.	Ponded.	
53	1	2.73 feet Ponded, no flow.	1 pond, dry.	Change to dry.	Dry.	

1. Subdrainages having no perennial/intermittent ponds or perennial/intermittent ponds that were dry in the 1989-1996 time frame were excluded from the data set.
2. Average flow is an average of flow events and does not include instances where no flow occurred during the 1989-1996 or 2004 time frame.

All nineteen perennial/intermittent ponds being monitored either held ponded water or were dry in 2004 and 2005. The term ponded as used in these tables indicates water observed in the pond, but below the base of the pond staff gauge. Average depth is an average for ponds in the data set, and average flow is the average for ponds that flowed in the first monitoring period. Only subdrainage 52 had a pond (52227) that did not go dry in the second period of monitoring.

A review of ephemeral ponds indicates only three ponds in Subdraiange 14 contained water in the first monitoring period. Of these three ponds only one (14537) held water in the 1989-1995 period. All of the ponds were dry during the second monitoring period.

A comparison of stream flow lengths between the first and second period of monitoring reveals that only 7 subdrainages had stream lengths with observed flow in the first monitoring period. Crest gauge data indicate flow occurred at other times during the 1989 through 1996 period than what was observed. The stream lengths went dry during the period of no monitoring and have not recovered to the previous extent.

Water Quality

The named springs that had flow during one of the monitoring periods and the unnamed springs that had flow during both monitoring periods and are in the permit or amendment area are listed in Table 1. Those springs were evaluated for a number of water quality parameters. The evaluation reviewed data taken from the 1989-1996 and 2004-2005 (with some 2003 data) time periods. The acceptable range of pH for livestock is 6.5 to 8.5 and for irrigation of crops it ranges from 4.5 to 9.0 (EPA, 1996).

The data indicate that pH varies somewhat but remains in the acceptable range for irrigation. The water quality at times exceeds the upper limit of what is acceptable for livestock. However, average values remain well within the acceptable range. The average values between the two monitoring periods remains relatively the same.

For irrigation purposes, specific conductance limitations vary with the choice of crop and ranges from a threshold of 2,000 umhos/cm at 25^{o}C for alfalfa to 7,500 umhos/cm at 25^{o}C for tall wheat grass (U.S.G.S., 1998). The observed values are relatively low with the exception of Litsky Spring (17415) and Spring 17185 approaching the upper limit of acceptability for alfalfa in the first period of monitoring. There is no set limit for cattle.

Total Dissolved Solids (TDS) describes the concentration of dissolved materials in water. The major anion constituents of TDS in surface waters include carbonates, sulfates, chlorides, phosphates and nitrates. These anions occur in combination with cations such as calcium, sodium, potassium, magnesium and iron (EPA, 1972). For livestock water a value of 2,500 to 3,500 mg/l TDS is considered fair; 3,500 to 4,500 mg/l, poor; and above 4,500 mg/l as unfit (McKee & Wolf, 1963). The EPA (1973) suggests that water with a TDS of 3,000 mg/l or less should be satisfactory for livestock under almost any circumstance. The TDS criteria for water used in irrigation vary from 500 to 2,000 mg/l (MBMG, 1991). The observed TDS values are relatively low for livestock with a maximum value of 1510 at Spring 17185. Depending on type of crop the water may or may not be suitable for irrigation.

The value of 2,000 mg/l for alkalinity, an indicator of carbonate, bicarbonate and hydroxide ions, is used to denote buffering capacity and when water suitability begins to decrease (NAS & NRC, 1984). It is also recommended that total alkalinity of water not be decreased by more than 25 percent below the natural level (EPA, 1973). Alkalinity can affect water used for irrigation in that the relative proportion of sodium may be raised as calcium and magnesium ions precipitate out as carbonates, although there are no established criteria (EPA, 1986). The observed values are relatively low with the highest maximum values of 832 and average value of 803 found in Spring 16755 in the first monitoring period. The springs have a low buffering capacity which explains the variation in pH.

A recommended limitation of 1,500 mg/l of sulfate in stockwater has been set by the Montana Bureau of Mines and Geology (MBMG, 1991). Other sources show much higher limiting values, up to 3,000 mg/l for livestock. The observed sulfate values are all well below the recommended value of 1,500 mg/l for both monitoring periods and therefore this parameter should not hinder use of these sources of water.

There are no set limits of Sodium Absorption Rate (SAR) for cattle. Depending on soil texture, critical SAR ratios for flood irrigation range from a value of eight to eighteen for general crops and forages (EPA, 1986). The observed SAR values are all low, indicating a low ratio of sodium to calcium and magnesium.

There are a total of 5 ponds (14687, 16667, 17317, 17417 and 17517) listed as perennial/intermittent in the permit and amendment area. Water quality data was collected from these ponds during the first monitoring period. The ponds were dry during the second monitoring period. The parameter of pH is high in all five ponds. With an acceptable pH for livestock ranging from 6.5 to 8.5 (EPA, 1996) these ponds are near or above acceptable limits.

Table 3. pH 1989-1996 Monitoring Period for Perennial/Intermittent Ponds in Permit and Proposed Amendment Area

Pond	Minimum	Maximum	Average	Number of Samples	Date of First Sample	Date of Last Sample

14687	7.95	9.67	8.53	21	5/15/91	7/1/96
16667	7.86	9.06	8.53	28	7/18/91	10/1/96
17317	7.57	9.1	8.59	22	5/17/91	11/1/96
17417	7.74	9.72	8.33	40	10/16/91	10/1/96
17517	7.17	9.82	8.57	19	7/9/91	10/1/96

AVF

The Department has previously determined (Meridian Written Findings, 1993) that Rehder Creek from the confluence of two tributary arms in T6N, R27E, Section 7 to Rehder Creek confluence with Halfbreed Creek in T6N, R26E, Section 32 is an alluvial valley floor. The amendment area will extend southwards, away and upgradient from that region, and into the upper-most region of Razor Creek and Pompey's Pillar Creek. Much of this area was included in the previous study. Although water quality may be suitable for irrigation there is insufficient water to allow for this practice, which by definition [ARM 17.24.301(135)] may also be classified as an upland area. Therefore, the amendment area does not contain an AVF.

Potential Impacts

Two springs (17145 and 17185) in the amendment area are listed as having a moderate impact potential while Spring 17275 is listed as having a low impact potential as noted in Table 4. Bull Spring (17145) experienced an increase in flow between the two monitoring periods; from 1.56 gpm to 1.81 gpm (2005). This was after experiencing an 80% reduction in flow during 2004. Spring 17185 experienced a 92% reduction in flow in 2004 with a recovery to a 54% reduction of flow in 2005. Spring 17272 experienced an 82% reduction of flow in 2004 with a recovery to a 35% reduction of flow in 2005. Natural variability in precipitation and subsequently in flow may obscure any short term impacts from mining. It is anticipated that monitoring efforts will provide sufficient data to allow for the differentiation between precipitation based variability in spring flows and impacts resulting from subsidence caused by underground mining operations.

Changes in water quality are expected within the fracture zone due to water coming into contact with collapsed rubble and fresh mineral surfaces. Increases in TDS are likely to be most evident from water draining from the mine portal.

Mitigation plans already exist in the permit. The plans include restoring springs, stream reaches, and ponds by opportunistic development of springs where they appear, guzzler emplacements, horizontal wells, vertical wells, pipeline systems, deepening or rehabilitating existing wells, reclamation of stream reaches and function, and water treatment where appropriate or necessary and restoring premine land uses (Meridian Written Findings, 1993). Similar, site-specific measures would be implemented within the amendment area as negative impacts resulting from subsidence are identified.

Material Damage:

It is anticipated there would be no material damage to surface water. The anticipated impacts occurring to existing surface water quantity and quality would not be significant enough to preclude the existing uses of the surface water resource when mining and reclamation are complete.

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Ground Water Environmental Assessment

BMPII has submitted an amendment to expand Bull Mountains Mine No. 1, an underground coal mine, southeastward approximately two miles, to include portions of the Mammoth Coal underlying the southern part of Dunn Mountain. The amendment would add approximately 2,172 acres to the permit area. The amended permit would include a total of 6,383 acres. The permit area consists of a surface facility area located near the portals to the underground mine, and lands that would be undermined.

An environmental impact statement was prepared by the Montana Department of State Lands in 1992 (MDSL, 1992) for Meridian Mineral Co., coal mining permit #92017. Following a legal action that required the permit to be reissued, a cumulative hydrologic impact assessment was later conducted as part of written findings (MDSL, 1993) for coal mining permit #93017.

The permit and proposed amendment area of Bull Mountains Mine No.1 is situated on the west side of the Bull Mountains. The Bull Mountains range in elevation from about 3700 feet to 4700 feet in the Bull Mountains Mine No. 1 study area (Meridian, 1990). The topography of the area is generally hilly with highest areas typically being clinker capped ridges. Ephemeral streams are found throughout the area, with larger streams having relatively flat valley bottoms that are up to about ¼ mile wide. Perennial flow has been observed and mapped along portions of the streams, supported by springs or other manifestations of groundwater baseflow, most abundantly during wetter years.

Average annual precipitation is estimated to range from 10 to 11 inches in low areas to about 14 inches at higher elevations (Thompson, 1982; MDSL, 1992). Long term records of precipitation data for Roundup and Billings are provided in the 2005 Annual Hydrology Report for Bull Mountains Mine No. 1 (BMPII, 2006). A graph showing annual precipitation at Roundup from 1984 through 2005 is presented in the Surface Water Cumulative Hydrologic Impact Assessment for this project, along with a brief discussion. Precipitation at Roundup was generally above average during the early years of the project (1989 through 1996) and below average from 1997 to 2004. While 2005 was a relatively wet year with 17.79 inches recorded at Roundup.

Geologic and Hydrologic Aspects of Mining

The main hydrologic issue surrounding the Bull Mountains Mine No 1 is the potential for loss or diminution of the quantity and quality of groundwater, and the resulting impacts to wells, springs, stream reaches, and ponds above the mined area. These impacts can occur when subsidence fractures intercept water bearing materials.

During mining, water is removed from the mine by dewatering pumps and through evaporation by ventilation fans. Water sources include the Mammoth Coal, the underburden, and the overburden. The Mammoth Coal would be removed and replaced by a rubble zone. The underburden would contribute a very limited amount of water because of its low hydraulic conductivity and storativity. The overburden would experience fracturing and partial dewatering above the mined area.

After mining ceases, the mine voids are allowed to flood, forming a mine pool. Once the groundwater flow through the mined areas reaches a relatively stable equilibrium, a mine pool would be established. Changes in hydraulic conductivity and storativity of strata in the mined area, and drainage of water into the mine pool, would cause a change in the configuration of hydraulic head in mined area. The net effect would be that the groundwater gradient would be flattened in the mine rubble zone. This would leave an area of decreased groundwater elevations in the upgradient part of the mined area, and an area of higher groundwater elevations in the downgradient part of the mined area.

Because of the anticipated water level, the mine pool is expected to discharge at the mine portal. Portal discharge is proposed to be controlled by a portal seal and a piping system for discharge to PM Draw. Even without a discharge through a pipe, the temporary effectiveness of the portal seal would probably not allow water levels to rise much beyond the elevation of the portal (3850 feet above mean sea level). The portal seals are designed with an operational life, and chemical and physical deterioration would be expected to occur within a relatively short term. In addition, seepage through the fractured shallow bedrock around the portal seals should preclude filling of the mine pool above 3860 feet.

Spring and groundwater flow that is intercepted by subsidence fractures and drained into the mine voids could: 1) emerge as portal discharge, 2) increase the water levels in overburden, alluvial, or underburden units, 3) increase flow at springs or streams now existing at lower elevations than the mine pool water level, or 4) emerge as new or relocated springs or streams. Outside of the mined and subsided area, the potentiometric surface (hydrostatic pressure) would be changed from pre-mining conditions. Because the mine pool represents a small increase in hydrostatic pressure within the Mammoth Coal, few new springs are expected. However, along the western flank of the syncline the Mammoth Coal is currently unsaturated. With the mine pool causing a higher post-mining water level in the Mammoth Coal, the western flank of the syncline may be an area for the potential emergence of new springs (mine pool discharges).

Use of Groundwater: Springs, Wells, Baseflow

The monitoring, potential impacts, and mitigation efforts for springs and baseflow are discussed in the surface water cumulative hydrologic impacts assessment (CHIA). Existing private wells have been inventoried and are provided in the mine permit Table 305(5)-10 and Map 304(5)-3. Most of the existing private wells are outside of the mine plan area.

Six wells may be undermined by the permitted and amended longwall mining areas and would likely need replaced after mining. Three wells are located within the permit amendment area; two wells in the SW ¼ of Section 28, T6N, R27E, and one in listed in Section 33, T6N, R27E.

Potential Impacts

Water Quantity and Flow

The subsidence-related fractured zone is expected to develop to approximately 300 to 400 feet above the mine voids. Above the height that fractures develop, post-mining aquifer characteristics would probably be similar to pre-mining characteristics. Below this level, fractures would probably develop that would interconnect aquifers and the mine voids. As subsidence progresses, some fractures may partially close and some may remain open due to differences in compressional forces, infilling and hydration of swelling clays.

Dewatering in the Mammoth Coal itself and the impacts of the refilling of the mine pool after mining are expected to extend no more that about two miles from the active mining area. At these distances, the water level changes predicted are minor and insignificant in terms of impacts to existing uses. The potential for problematic groundwater level changes increases closer to the planned area of active mining. The dewatering and mine pool analysis was conducted using a three dimensional groundwater model as described in the mine permit, Volume 9, 26.4.314 (addressing current ARM 17.24.314), Plan for the Protection of the Hydrologic Balance, Section 4.0 Probable Hydrologic Consequences, Subsection 4.1.2. Impact Due to Mine Dewatering.

Due to the presence of shales in the mine floor, water from the mine pool is not expected to migrate into the

underburden at rates much greater than pre-mining rates. Since the Mammoth Coal outcrop circumscribes the higher portions of the Bull Mountains, impacts are expected to be limited to that area within the cropline and for a short distance downgradient in adjacent drainages. The zone of dewatering that forms above and adjacent to the mine pool may affect spring and stream flows and well levels at some sites.

Withdrawals of groundwater for consumptive uses by the mine would be largely from the deep Madison Group well that is over 8600 feet deep. This aquifer is so hydrologically removed from the shallow system that impacts to the shallow system are virtually impossible. A limited amount of water would be withdrawn from the underburden aquifer for the office and shower facilities. Water meters are present on all of the shallow water sources in the main mine facilities area.

Water Quality

Water quality is not expected to change in the aquifers, springs or streams that are above the subsidence-related fracture zone (see the surface and groundwater cumulative hydrologic impacts analyses for a summary of existing water quality). Within the fracture zone, water that is drained into the mine pool and comes into contact with collapsed rubble is expected to show increases in the concentration of dissolved solids due to increased exposure of fresh mineral surfaces. These increases may range from a few percent to twice the pre-mining concentration (e.g. increases of a few hundred to several thousand mg/L TDS).

Changes in water quality are also possible for any impacted water sources replaced by some proposed mitigations (e.g. deeper wells, reconstructed alluvial/shallow bedrock aquifers). However, BMPII has committed to mitigating adverse impacts to water chemistry if it is altered to an extent that preempts restoration of dependent land uses or aquatic habitat requirements. Suspended sediment concentrations in storm or snowmelt runoff would likely increase in areas where spring, stream, pond or alluvial aquifer reclamation is attempted. However, premining levels of suspended sediments should recover with vegetative establishment well before bond release.

The construction of the waste disposal facility would result in a significantly changed drainage morphology. Within limitations for long-term structural stability and diversion of surface runoff, the reclaimed waste disposal facility would be designed to blend with and approximate adjacent benchland topography and vegetation. Changes in ground water quality or other discharges below the waste disposal facility are also possible depending on the extent of surface infiltration through the compacted coal waste material, or if the postmining mine pool level intersects the fill material. Any of these circumstances would require appropriate remedial procedures (e.g. pumping, treatment).

Identifying Impacts

Water resource functions and uses are determined through a multi-disciplinary assessment of physical, chemical and biological aspects of the system. Water quality criteria for some human health, aquatic life, livestock, and irrigation requirements have been established in state and federal standards, guidelines, and other reports (e.g. Hem, 1985; McKee and Wolf, 1963; NAS/NEA, 1973; Thurston et al., 1979; U.S. EPA, 1976; 1986).

Impacts of mining on existing water supply wells would be identified using BMPII's baseline and operational monitoring program. For well water quantity, drawdowns of water levels in the coal, overburden, and underburden would be determined and updated annually.

For well water quality, TDS concentrations measured in BMPII's groundwater monitoring wells in the coal, overburden, and underburden would be compared with baseline concentrations to identify possible trends.

Groundwater quality within the vicinity of the monitoring well would be identified as potentially impacted if there is a statistically significant increase in the TDS concentrations in four successive samples relative to the TDS concentrations measured during the baseline and operational monitoring periods. If the concentrations of TDS or major ions in an affected well exceed the corresponding use standards, the water quality would be assumed to be impacted.

Mitigation Measures

Water supply wells located within the five foot drawdown zone of their respective unit would be identified as potentially impacted. BMPII would evaluate measures to mitigate the impacts to water supply such as rehabilitating the well, deepening the well, or drilling a new well. Water supply wells that are determined to be impacted by mining would be evaluated by BMPII and measures to mitigate the impacts to water quality would be determined, such as rehabilitating or deepening the well, or drilling a new well.

Material Damage

There would be no material damage to the groundwater system that would preclude the reestablishment of groundwater wells at the mine site by the installation of a replacement water supply.

REFERENCES

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McKee, J.E. and H.W. Wolf. 1963. Water Quality Criteria. 2nd ed. Publ. No. 3-A, State Water Quality Control Board, Sacramento, CA. 548 pages.

MDEQ: Montana Department of Environmental Quality, 2006; Surface Water Cumulative Hydrologic Impact Assessment for Application 00178, Bull Mountains Mine No. 1, BMP Investments, Inc.

MDSL: Montana Department of State Lands, 1992; Final Environmental Impact Statement, Meridian Minerals Company Bull Mountains Mine No. 1, Musselshell and Yellowstone Counties, Montana.

Meridian: Meridian Minerals Company, 1990; Bull Mountain Mine No. 1 permit application, Musselshell County, Montana. 14 Volumes. Submitted to Montana Department of State Lands and Office of Surface Mining Reclamation and Enforcement.

National Academy of Sciences, National Academy of Engineering. 1973. Water Quality Criteria 1972. EPA Ecol. Res. Series EPA-R3-73-033, U.S. Environmental Protection Agency, Washington, D.C. 594 pages.

Thompson, K.S., 1982; Ground Water and Potential Coal Mining in the Bull Mountains, South-Central Montana; Montana Bureau of Mines and Geology Open File Report 100.

Thurston, R.V., R.C. Russo, C.M. Fetterolf, Jr., T.A. Edsall and Y.M. Barber, Jr. (Eds.) 1979. A Review of the EPA Redbook: Quality Criteria for Water. Water Quality Section, American Fisheries Society, Bethesda, MD. 313 pages.

U.S. Environmental Protection Agency. 1976. Quality Criteria for Water. Office of Water and Hazardous Materials, U.S. EPA, Washington, D.C. 256 pages

U.S. Environmental Protection Agency. 1986. Quality Criteria for Water, 1986. Office of Water Regulations and Standards, EPA/440/5-86/001, U.S. EPA, Washington, D.C. 398 pages.

Reclamation Plan:

Since the amendment only addresses the expansion of underground mining, no changes to the reclamation plan are proposed. Generic plans for the mitigation of negative impacts to spring and seeps were included in SMP 93017 when it was originally approved. Site specific plans for the repair and/or mitigation of impacts resulting from subsidence would be developed as they are identified. This allows plans to incorporate site-specific considerations.

N = Not present or No Impact will occur.
Y = Impacts may occur (explain under Potential Impacts).

IMPACTS ON THE PHYSICAL ENVIRONMENT	
RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES
1. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE: Are soils present which are fragile, erosive, susceptible to compaction, or unstable? Are there unusual or unstable geologic features? Are there special reclamation considerations?	[Y] The proposed amendment to Bull Mountains Mine No. 1 is for the expansion of underground mining; therefore, the soil resource would remain relatively undisturbed. Disturbance would consist of previously approved facility areas (e.g. office buildings, roads, waste disposal areas, a rail loop, ponds, and support for the processing of the coal). The area required for these activities is already disturbed and currently permitted. Soils included in the area covered by the proposed amendment are going to remain in place; however, the mine would pass under the surface with a longwall operation. The mining activity is expected to create subsidence on the surface. Other than creating undulations in the topography, the surface may sustain some cracking. Mechanical treatment of subsidence may be more degrading to the soils than leaving them to repair in situ. Since soil profiles would remain mostly intact the chemical and physical characteristics should remain consistent. Repair and/or mitigation of surface subsidence would be evaluated on a site-specific basis. Soil salvage, regrading, soil replacement and seeding may be necessary to restore the surface configuration necessary to maintain stream profiles, minimize erosion and ensure the pre-mine land use is maintained. All areas of disturbance (e.g. facilities areas) were previously permitted with a reclamation plan that follows applicable rules and regulations set

IMPACTS ON THE PHYSICAL ENVIRONMENT	
	forth in the Administrative Rules of Montana (ARM).
2. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality?	[Y] See previous discussion of surface and groundwater.
3. AIR QUALITY: Will pollutants or particulate be produced? Is the project influenced by air quality regulations or zones (Class I airshed)?	[Y] The proposed amendment would be an extension of the underground mining operation. Therefore, no direct impact to air quality from the mining activity is anticipated. The proposed increased production rate would result in additional fugitive dust (e.g. run-of-mine storage, coal processing, haulage). These impacts to air quality would be addressed through review of the air quality permit.
4. VEGETATION COVER, QUANTITY AND QUALITY: Will vegetative communities be significantly impacted? Are any rare plants or cover types present?	[N] Mining activities within the proposed amendment area would be all underground; therefore, there would be no direct impact to the vegetative communities. Subsidence resulting from the underground mining would result in localized areas of surface disturbance (e.g. cracks, areas of sloughing, etc.). Without any examples of subsidence within the local region, representing the mining method and geologic stratigraphy, it is difficult at best to predict the extent of surface damage related to subsidence. Areas of surface disturbance would be evaluated and a site-specific repair/mitigation plan developed and implemented unless it was determined that the extent of the surface disturbance did not warrant repair/mitigation and natural healing would be the best alternative. Areas needing repair would have the soil salvaged from the site (minimizing the total disturbance) the site repaired/regraded, soil replaced and then seeded with an approved seed mix. The proposed mining method would result in large panels subsiding as a unit. It is anticipated that this type of subsidence would have minimal affect on deep rooted plant species, such as ponderosa pine; however, some trees may be severely damaged, especially if they are located on a slough or subsidence crack.
5. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish?	[N] As discussed in the surface water surface water assessment, there are three springs located within the proposed amendment area. These springs are important to grazing livestock and to the local wildlife community. The water provided by these springs helps ensure livestock distribution throughout the grazing pastures, providing a better vegetation utilization pattern than would be evidenced if these water sources were not present. This in turn allows for more overall grazing of the area, increasing the economic return to the land owner. A variety of wildlife species, including small mammals, bats, song birds, shorebirds, upland game birds, raptors and big game, utilize the springs and

IMPACTS ON THE PHYSICAL ENVIRONMENT	
	associated areas of ponded water.
6. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present? Any wetlands? Species of special concern?	[N] No threatened, endangered or sensitive plant species have been identified within the permit or amendment areas. No endangered animal species have been identified within the proposed amendment area. Nineteen wildlife species of special concern have been observed in the wildlife monitoring area. These include the bald eagle (listed as a threatened species by USFWS), northern goshawk, Swainson's hawk, ferruginous hawk, long-billed curlew, Lewis's woodpecker, red-headed woodpecker, Cassin's kingbird, loggerhead shrike, Brewer's sparrow, lark bunting, grasshopper sparrow, chestnut-collared longspur, gray-crowned rosy finch, Townsend's big-eared bat, spotted bat, Great Plains toad, northern leopard frog, sagebrush lizard. The majority of these species are considered transients or occasional visitors to the permit and proposed amendment areas. Three species (e.g. red-headed woodpecker, Cassin's kingbird and northern leopard frog) have been observed on a regular basis and should be considered residents. Three other species (e.g. Townsend's big-eared bat, spotted bat and sagebrush lizard) have been observed during regular surveys within the monitoring area; however, additional surveys are needed to better define whether or not they are residents of the area. Several of these species may be impacted if mining subsidence negatively impacts the spring and associated wetlands found in the amendment area.
7. HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present?	[N] The approved permit area cultural resource obligations involved Class III (Intensive) archeological/cultural inventory on all of the proposed surface disturbance area, plus literature search and rock art and standing-structure evaluation of the area overlying underground mining. This was completed in 1989, with supplemental intensive inventory of all known springs in 1992. Native American consultation (under AIRFA authority) was completed in 1993. In addition, the permit included a stipulation that steep-slope areas (>25%) would be upgraded to Class III before starting longwall mining. The area of the proposed amendment was subjected to literature search in 2006, and is obligated for rock art and standing-structure evaluation prior to commencing longwall mining (currently underway, due to earlier wet-season access problems). The amendment is for extension of underground activities of an existing mine, and the only significant surface disturbance anticipated is the possibility of some surface failure on steep slope areas where few archeological/historical resources are expected. No additional archeological or historical sites have been discovered, and no impacts to known archeological or historical sites should occur. Protection of any incidentally discovered sites is stipulated in the approved surface mining permit
8. AESTHETICS: Is the project on a prominent topographic feature?	[Y] The proposed permit amendment would extend the Bull Mountains Mine No. 1 in a southeasterly direction from Fattig Creek to the

IMPACTS ON THE PHYSICAL ENVIRONMENT	
Will it be visible from populated or scenic areas? Will there be excessive noise or light?	southern exposure of Dunn Mountain. This mountain is a very dominant feature of the Bull Mountains and is visible for a significant distance in many directions, including from the rims above the Yellowstone Valley in the vicinity of Billings. This landmark would be mined under with a resulting subsidence estimated to be up to 8 feet. While this level of subsidence is anticipated to be unobservable to most, especially when viewed at a distance, if the subsidence is greater than expected or more irregular in nature noticeable changes to the surface topography may become apparent.
9. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY: Will the project use resources that are limited in the area? Are there other activities nearby that will affect the project?	[N] Water from the underburden wells has been limited to office and bath house use. This use is rather insignificant and is not expected to have a detrimental impact on the quantity and quality of the underburden wells. BMPII has completed one deep well into the Madison formation and is permitted to drill and use a second well into this formation. While BMPII has had difficulty keeping the pump running properly and maintaining the necessary water supply, the deep well water supply is the only permitted major water source. Water may also be trucked into the site; however, use of this option is economically limited. It is anticipated that use of the Madison aquifer will not affect any other uses in the area.
10. IMPACTS ON OTHER ENVIRONMENTAL RESOURCES: Are there other activities nearby that will affect the project?	[Y] An air quality permit has been issued for a proposed power plant in proximity to the western permit boundary. The coal for this plant would be obtained from the Bull Mountains Mine No.1 and potentially from other future mines in the area. Continued use of the surface for livestock production and wildlife habitat would require the operator to minimize and/or repair the surface impacts resulting from subsidence.

IMPACTS ON THE HUMAN POPULATION	
11. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	[Y] Subsidence due to underground mining would result in lowering of the land surface by an estimated 5-8 feet. It is anticipated that the majority of the subsidence would occur uniformly with minimal impacts to the surface disturbance. Surface cracking and sloughing of steep slopes may also occur. As underground mining proceeds, at up to 55 feet per day, there is potential for humans, livestock and wildlife to get injured as subsidence occurs. To minimize the potential impact to humans and livestock, the operator is required to publish the mining schedule at least 6 months prior to mining under an individuals land [ARM 17.24.911(5)].
12. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these	[N] It is not anticipated that the pre-mining land use of grazing land would be significantly impacted by the underground mining activity and subsequent subsidence. Surface impacts that affect this use (e.g. damage to fences, sloughing of side slopes blocking access to areas, subsidence

IMPACTS ON THE HUMAN POPULATION	
activities?	cracks) are not anticipated to be significant to livestock use of the area. It is expected that these impacts would be short-term, as the operator would be required to repair the damages. Subsidence could impact existing wells and springs; however, loss of these water sources would result in development and implementation of a plan to replace them.
13. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so, estimated number.	[N] The approved permit included longwall mining and the increased workforce needed to operate it and the associated surface facilities. The proposed permit amendment would add acreage and tonnage to the permit; however, it should not significantly increase the required workforce.
14. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue?	[Y] The mining of additional coal reserves would result in additional coal severance taxes being collected by the state. Continual employment of the current and projected workforce would result in additional federal and state income taxes being collected. Musselshell and Yellowstone counties would collect gross proceeds taxes based on the mine development within the respective county. Property taxes would be collected on the mine facilities and equipment based on its location on the reporting date. Surface lands within the amendment area are currently classified as agricultural; therefore, their assessed value is within the lowest tax category. The landowner can request the county review lands impacted by subsidence, which may result in a slight reduction in the assessed land value and subsequent reduction in taxes.
15. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc.) be needed?	[N] It is not anticipated that the demand for government services would exceed that projected during the review and approval of the initial mine permit.
16. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans in effect?	[N] None were identified.
17. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES: Are wilderness or recreational areas nearby or accessed through this tract? Is there recreational potential within the tract?	[Y] There is no high volume recreational area or wilderness area present within or adjacent to the proposed amendment area. The proposed amendment area is private land with access controlled by the land owner. Hunting, sight seeing, and the ability to get within a fairly large tract of undeveloped land are the main recreational activities.
18. DENSITY AND DISTRIBUTION OF	[N] The proposed amendment would continue employment at the projected levels; therefore, it is not anticipated that additional housing

IMPACTS ON THE HUMAN POPULATION	
POPULATION AND HOUSING: Will the project add to the population and require additional housing?	would be required. The project is not expected to significantly affect local populations. Neither population increase nor residential decrease would be incurred by approving the project.
19. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible?	[N] Historic and cultural resources are fully covered under Item 7, Historic and Archeological Sites.
20. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	[N]] The project is not expected to significantly impact any inventoried Historic and Archeological Sites (see Item 7, above). An inventory of rock art and standing structures is currently being conducted and a report must be compiled prior to the initiation of longwall mining. Due to the results of earlier field surveys, it is anticipated that a minimum number of sites would be found during the inventory.
21. PRIVATE PROPERTY IMPACTS: Are we regulating the use of private property under a regulatory statute adopted pursuant to the police power of the state? (Property management, grants of financial assistance, and the exercise of the power of eminent domain are not within this category.) If not, no further analysis is required.	[Y]
22. PRIVATE PROPERTY IMPACTS: Does the proposed regulatory action restrict the use of the regulated person s private property? If not, no further analysis is required.	[Y] The lands within the proposed amendment are owned by Bull Mountain Land and Minerals (T6N, R27E, Sections 20, 30, and 29), Ellen Pfister (T6N, R27E, Sections 28, 33, and 34), Ellen Pfister and Don Golder (T6N, R27E, E½NE¼ Section 33), and US government (BLM) (T6N, R27E, N½ Section 32). The mineral reserves are owned by Bull Mountain Coal Properties and leased by BMPII. Mining of the coal reserve would allow Bull Mountain Coal Properties to realize economic gain from the development of its mineral assets. Surface uses would be limited during a period of time when mining is proceeding and there is a risk of subsidence. Proposed state government activities would place some restrictions on the owner's use of the surface property, but not sufficient enough to constitute a taking because the owner is not deprived of property or all economic uses of that property.
23. PRIVATE PROPERTY IMPACTS: Does the agency have legal discretion to impose or not impose the proposed restriction or discretion as to how the restriction will be imposed? If not, no further	[Y] The Department has a level of discretion in its permitting decisions.

IMPACTS ON THE HUMAN POPULATION	
analysis is required. If so, the agency must determine if there are alternatives that would reduce, minimize or eliminate the restriction on the use of private property, and analyze such alternatives.	
24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:	[N]

25. Alternatives Considered:

No Action: The proposed mine area within Application 178 would remain outside the boundaries of SMP 93017 and undisturbed by coal mining activities. Mining and reclamation would continue within the remainder of the Bull Mountains Mine No.1 as currently permitted; however, the potential use of this coal reserve would not be realized.

Approval: Coal mining operations would begin under authority of BMPII's permit (SMP 93017) and would be subject to requirements of that permit, including reclamation requirements. Reclamation would proceed according to the requirements described in the Reclamation Plan.

26. Public Involvement: Availability of this Environmental Assessment will be published in the *The Roundup Record-Tribune*. The EA will also be available on the DEQ Internet site (http://www.deq.mt.gov). Draft copies of the EA were also furnished to the Bull Mountain Landowner Alliance, Jeanne Charter, Ellen Pfister, and BMPII for review and comment. Copies of the application are available for public review at the Bull Mountain Mine No.1 office, the Musselshell County Courthouse in Roundup, the Yellowstone County Courthouse in Billings, and at the DEQ offices in Helena and Billings.

27. Other Governmental Agencies with Jurisdiction: USDI, Bureau of Land Management manages the federal surface in T6N, R27E, N½ Section 32.

28. Magnitude and Significance of Potential Impacts: Impacts of the entire operation were analyzed in the EIS. There would be no significant impacts associated with this expansion that were not previously addressed in the EIS.

29. Cumulative Effects: No other new activities have been identified in the area.

Recommendation for Further Environmental Analysis:

[ ] EIS [ ] More Detailed EA [X] No Further Analysis

EA Checklist Prepared By:

Julian Calabrese, Soil Scientist
Catherine Dreesbach, Mining Engineer, PE
Herb Rolfes, Surface Water Hydrologist
Kirk Waren, Groundwater Hydrologist
Bob Bohman, Archeologist
Chris Yde, Coal Program Permitting Supervisor (Wildlife and Vegetation)

Approved By: Neil Harrington

_____ _____

Signature Date

Attachment 1
Responses to Comments Received from Ellen Pfister and BMPII

Ellen Pfister, owner of lands within and adjacent to the proposed mine amendment area, submitted the following comments on the draft EA. The comments, submitted via e-mail, were received within the defined comment period. Following is a listing of Ms. Pfister's comments, as well as the Department's response.

1. Notice of this permit amendment should also be advertised in Yellowstone County, Montana, since the bulk of the changes in application 00176 (sic) affect lands located in Yellowstone County, and the Roundup Record Tribune hardly passes for a newspaper of general circulation in Yellowstone County.

Response: When the Department ruled Application 00178 complete, BMPII placed an advertisement in the Roundup Record Tribune. The advertisement was published on March 15, 22, 29 and April 5, 2006. This fulfilled the requirements of ARM 17.24.401(3). The Department has noted Ms. Pfister's concern and will request that future publications such as these be published in both newspapers; however, this will only be a request as the rules require publication in only one newspaper of general circulation.

2. In relation to the discussion of subsidence on page 4, does the amount of subsidence and the severity of fracturing of the rock increase or decrease proportionately to the amount of overburden over the coal, and if so by that (sic) amounts does it increase or decrease?

Response: The geotechnical study presented by Agapito uses the NCB method to predict subsidence. This method tends to overestimate the amount of subsidence, and is therefore considered a liberal approach. Given the overburden depths encountered at the Bull Mountains Mine (200 – 800 feet of cover), the amount of subsidence neither increases nor decreases in proportion to the overburden depth. Subsidence is only depth dependent for cases where the ratio of the panel width to overburden depth is less than 1.2. At the Bull Mountains Mine, the overburden depth would have to be greater than 1000 feet before one could expect to see depth-dependent effects. The maximum amount by which the ground subsides is a function of the mined seam height (coal thickness) and the subsidence factor. The subsidence factor is a function of the percentage of hardrock in the overburden and the dimension of the mined-out area. Subsidence decreases as a function of the distance from the center of the longwall panel. The amount of decrease can be estimated by multiplying the maximum subsidence by the ratio of the distance from the center of the panel to the overburden depth.

3. I also notice on page 4 in several places discussion of EXPECTED results. The listing of supporting documents in two places further on in this EA lists no new significant scientific information on long wall mining after l992. This is the information that the old permit was based on nearly 15 years ago. Surely there have been some new studies since then that could refine the "expected results". Are there really any mines that are using the new gateroad designs? Have mines using the previous designs changed during mining to these new gateroad designs? If so, where? Has Agapito learned anything new since l990, or does he keep supporting his old expectations without new supporting evidence. Even the Kenneth Thompson open files paper is sited (sic) as evidence for water quality. Mr. Thompson's conclusions on longwall water were purely based on supposition, as he had not studied any of it from the bottom of a longwall mine. Surely someone has done something in that way in the last 20 years. There was a lawsuit about 7 years ago in Southern Colorado between Jim and Ann Tatum and the Golden Eagle longwall mine, in which the Tatums were awarded something like a million dollars in damages. It was probably filed in Las Animas County, Colorado. That might tell you something about "expected results."

Response: While mining machinery and technology has improved greatly in the last 20 years, there have been no significant changes in engineering practices in the area of subsidence control. Very little exists in the form of recent data collected at western longwall mines. The majority of western longwall mines are generally located under federal lands, unlike their eastern counterparts. This is why we are requiring extensive subsidence monitoring by BMPII, and why we are collecting data to study the effects of longwall mining on steep slope and other relevant features. The field of mining engineering is based on empirical methods that were mostly developed in the early 1900's, and are still valid today. In fact, some of the world's most reputable and respected mining engineers still use the *Mining Engineer's Handbook* by Robert Peele, first published in 1918, and last revised in 1947.

4. One of the things you did not discuss for mitigation was the power line that serves the communication towers in Section 33. It comes up the West side of Dunn Mountain and will cross the west edge of panel No. 2 over the angle of draw on a steep slope. It should be noted that if BMP, a/k/a Bull Mountain Coal Mining, Inc., begins longwall mining when they predict, it is possible that this line could break or go over on the slope during winter, when it would be very difficult for Fergus Electric to make repairs. If it should encounter the ground during the summer or fall, then the fire danger could be considerable. The current coal fire on Dunn began on the West end of Dunn during the 84 fire and has burned at least a quarter to half a mile along the south face now. Subsidence could open the air supply to that fire increasing its rate of burn and exposure to surface features.

Response: Although it was not specifically noted in the EA text, the Department considers the power line to be an integral part of the Dunn Mountain Communication tower assembly. The Department will consider all aspects of protection of the communication tower area when reviewing BMPII's mitigation submittal, and will require that the power line be addressed in the submittal.

It should be noted that the communication towers are towards the west edge of the second panel, where the subsidence is more unpredictable, less level, and more apt to be affected by the angle of draw. According to the blog of one man whose farm was undermined and toward the edge of the panel, the cracks and settling continued for at least 18 months after the land was undermined.

Response: The Department agrees that subsidence effects are somewhat unpredictable in steep slope areas, such as the west side of Dunn Mountain. However, the potential for subsidence-related damage must be evaluated in light of existing scientific data, as was done in preparing the EA.

5. How does this 6 month notice business work? Do we get one six month notice say when panel 2 starts up? Then do we have to keep our cattle out of the area for the next 4 years? Or do we get a notice for each panel, which will start on us and end on BMP? So what happens if the mine doesn't get its act together and get started mining within the six- month time. Are we still on notice? A six-month season for us is a grazing season. The area in this application is not fenced separately from the other 8 sections in the pasture. The area of our ranch covered in this application is summer grazing for approximately 60 pairs. If we cannot use this area for the next 5 years, we will have to reduce our cowherd by that amount costing us 60 calves for 5 years. Say those calves average 500 pounds, and are sold for $1.25 a pound, over 5 years your solution of keeping our cattle out of that area will cost us over $185,000 in lost income plus whatever cost there might be in an effort to barricade the permit area from the rest of the pasture. Those are not insignificant losses to us. It would take several miles of fence through very rough country to fence our cattle away from the permit area so that we could even use the rest of the pasture. If we have to move our cattle out of the Mountain Pasture during the summer, we have lost the whole grazing season and the income from all of our grown cows that year. We cannot use that pasture in

the winter and early spring.

Response: As stated on page 5 of the EA, landowners must be provided with a schedule at least 6 months prior to their property being undermined [ARM 17.24.911(5)]. The schedule must contain enough information to enable landowners to move cattle to safe areas, and to avoid hazardous areas while mining is taking place. If BMPII plans to deviate from the schedule provided to the landowner, they must notify the landowner. The Department will continue to encourage open and frequent communication between BMPII and the landowners.

Historical studies in Pennsylvania have shown that subsidence at a specific point is generally 90 percent complete by the time the longwall face has advanced about one overburden-width from that point. Based on this information, conditions should be safe for cattle in the Pfister pasture within a couple of weeks following the completion of mining below the pasture. Due to the size of the pasture it is also likely that wildlife and livestock will sense the underground mining and subsequent subsidence and avoid areas of active mining. However, since little data exist in mines with similar overburden properties, the Department will evaluate subsidence behavior in the first longwall panel. Data from the evaluation of the first longwall panel will provide the Department with a site-specific basis for determining when surface conditions are safe over subsequent longwall panels.

The permit needs to be marked in the immediate area of the longwall panels, both for our safety and for hunters and other (sic) who use that area. We do try to control hunters, but there are quite a few others who sneak in, and we have no idea who they are. We hear about them every year. Even hunters who are legitimate will not know where the dangerous places are. They do not want to talk about mine locations; they want to talk about where the deer and elk are. Even if one explains where things are to them, they often don't get it for their brains have migrated to the end of their guns.

Response: In accordance with ARM 17.24.523, BMPII must mark the perimeter of the permit boundary. At all access points, they will need to post signs that indicate it is private property and is an active mining operation. Although there are no specific requirements in the rules for posting active longwall areas in the immediate vicinity of the longwall panels, the Department will continue to encourage BMPII to work out cooperative agreements with landowners.

6. I suspect that the damage to roads will be more than minor. A fence that is broken several times eventually gets to be a wreck, even if repaired. We have had good boundary fences, but I doubt they will be so in the future.

Response: The Department maintains its position that minor damage to roads and fences is possible, as stated on page 5 of the EA. In this case, minor damage would be damage that does not impair the intended land use. If damage occurs that impairs the intended land use (e.g. roads are unsafe for travel, breaks in fences, etc.), BMPII will be required to repair damages in accordance with applicable rules and regulations.

7. Again, we have "expected" fracture zones on page 8 based on Meridian's l993 guestimate. In Ohio, fracture zones from 500 feet below the surface resulting from removing a coal seam equivalent in height to the Mammoth had no trouble reaching the surface and draining all wells and springs within three weeks of undermining. Three years later the water had not recovered. "Natural variability in precipitation and subsequently in flow may obscure any short term impacts from mining." I seriously doubt this statement. The only time the Ohio springs ran after being undermined was when they had the tail end of a hurricane come

through in one of their wettest summers ever. The springs ran for a couple of days and disappeared again. I think we will know and know soon after mining.

Response: Until mining occurs and the extent of the impact resulting from subsidence is evident, it is difficult at best to predict the impacts on the springs within and adjacent to the amendment area. The Department recognizes the landowner's anxiety because of this uncertainty. However, the bottom line is that the operator is required to restore the land to a condition capable of supporting the reasonably foreseeable uses it was capable of supporting before subsidence [17.24.911(7)(a)]. The Department added language to the EA in response to this comment.

8. When the pond staff gauges were set at the ponds, I doubt that the personnel setting them waded out to find where the spring water was actually coming into the pond. The permanent ponds are spring fed and count as permanent springs. The source of the springs was actually much further out into the pond than was marked.

Response: Ms. Pfister has identified several errors in the spring data base that need to be addressed. These will be addressed in the permit update revision. To adequately address deficiencies such as the one listed above, MDEQ is planning a coordinated field review of all the springs addressed by the monitoring plan early next field season. MDEQ hopes that personnel from BMPII, the landowners and Department surface and ground water hydrologists can participate in the field review.

9. If the surface water disappears as a result of undermining, would that loss be significant enough to preclude extending the permit for another 5 years? It would then be known what would happen to the surface water. If the permit were to be extended to the full 80 square miles that the mine intends to take, you would have totally damaged the heart of the recharge area for surface water in the Bull Mountains. I think that would be a material damage.

Response: As defined by the Administrative Rules of Montana, 17.24.301, "material damage" with respect to the hydrologic balance is the degradation or reduction by coal mining and reclamation operations of the quality or quantity of water outside of the permit area in a manner or to an extent that land uses or beneficial uses of water are adversely affected, water quality standards are violated, or water rights are impacted. This definition is what our bureau has to use in determining if there is "material damage." The predicted result of longwall mining is that some surface water and groundwater features may be impacted to some degree within the mine permit area, especially directly above mining and within the angle of draw for subsidence. Mitigation measures are planned to address these potential impacts. Water resources including springs, stream reaches, and wells above mining will be monitored and assessed to determine whether any impacts occur as a result of mining. The monitoring data and the success or failure of any required mitigation measures could indeed influence the permitting of additional longwall mining areas.

10. If surface water is lost, that is material damage, because any other method of water production is more expensive to develop, operate and maintain and less satisfactory. We have at times had sulfate problems in cattle in lower elevation wells here. We have never had sulfate problems in areas where we used the springs, such as the top of the mountain, which will now be undermined. Because our cattle could circulate freely and were not confined to one water source in the 11 section Mountain Pasture, we have never had sulfate problems with the use of that pasture. If we do encounter sulfate problems after mining, that will be a material damage to us, because those problems would then require constant treatment.

Response: BMPII is responsible for mitigating any damages to surface water resources, and mitigation plans described in the approved permit include a variety of potential water sources. The primary

source of water planned for water replacement is shallow groundwater developed from horizontal drains. This source is expected to be very similar in quality to existing springs and surface water sources.

11. Leaving an area with decreased groundwater elevations is a material damage to the water and to the land where that happens. See page 13. That water should not be allowed to freely run down the draw from the mine portal. It should be pumped back up to where it came from---from whence it was stolen. Just letting that water go down the draw from the mine portal is also likely to raise the alkalai levels in the valley below the mine and change the vegetation mix, as it has done below Colstrip on Armells Creek. You will note there are edges of alkalai showing along the edges of Halfbreed Creek down towards Roundup.

Response: Decreased water levels are not uncommon in mined areas. Steady state discharge rates from the portals area are expected to be low, and these discharges will likely contribute to alluvial groundwater rather than flow down the draw.

12. On page 14, the two wells spoken of in Section 28 and the one in Section 33 do not exist in those sections. We have owned those sections since l943, and we do know where the water is.

Response: These wells appear in the Montana Bureau of Mines and Geology database. We will drop them from our process based on your information.

13. The elevation of the mine portal is given as 3850 feet, 850 feet below the top of the mountain. We do have two wells within the 2 mile radius of this mine. I think their elevations are higher than the mine portal, and it is possible that the bottoms of the wells may be about equal to the portal elevation. That could bode ill for those wells. It should be noted that when those models for dewatering were run, it was not anticipated to dewater and mine the country to the south of the then mine boundary. The area where our wells are located is considerably further south of those models.

I would be curious as to exactly how the adverse impacts to water chemistry would be "mitigated" if the TDS went to the worst case scenario.

Response: A groundwater modeling effort was completed by BMPII and submitted as part of Application 178. However, this document arrived at the last minute, and may have been difficult to locate. A copy of the report should be available and situated with the permit application materials now at both our Helena and Billings offices. This effort extended south to the proposed new mine limits. Groundwater monitoring by BMPII should indicate whether any drawdown effects extend away from active mining areas. Any impacts to any of your wells must be mitigated by BMPII.

BMPII will have to mitigate impacts to water resources. As stated above, the primary source of water planned for water replacement is shallow groundwater developed from horizontal drains. This source should be largely unaffected by mining according to information in the BMPII approved permit.

14. On page 17, Items1 under Geology, etc. the author does not seem to understand that Dunn Mountain upon being subjected to a seismic event such as longwalling, will become inherently unstable along the edges and on the valley hill sides. This will probably be the largest seismic event in the area since the uplift of the Rocky Mountains. It will loosen the bonds between the soils and the rocks beneath on some of the currently grassy slopes. Those may not show immediate slippage. The rocks around and above the Little Cooke City Road will probably come down quite rapidly.

Response: As stated on page 5 of the EA, steep slopes may be prone to rockslides during the subsidence process. The edges of Dunn Mountain have the potential to become unstable during subsidence, depending on the location over longwall panels. However, the Department cannot make the statement that Dunn Mountain will become "inherently unstable."

Because seismic activity associated with normal longwall caving is generally small in magnitude and short in duration, seismic events are less of a concern to the Department than the ground displacement and stresses caused by subsidence. Regardless of how it occurs, damage to private property caused by undermining must be repaired.

Little Cooke City Road is located over what would be the 4th longwall panel. The Department has not included an evaluation of possible damage to this road, because it will not be undermined as a direct result of Application 178.

15. There have been no archeological studies done on our lands as far as we know. No one has ever asked to look. There should be no information in the literature. I do want to know what the results are of any studies, as well as the locations on my lands. If some one is out there looking around, I want to be notified.

Response: No work has been done on the Pfister property. BMPII will be required to complete the necessary archeological studies prior to the initiation of longwall mining. BMPII is currently working on an RFP for the archeology studies. They will notify the landowners prior to entry. BMPII has committed to making a copy of the report available to Ms. Pfister.

16. The operator is going to have to do better than a 6 month notice of mining to ensure human safety—ARM notwithstanding.

Response: The Department will continue to encourage regular and open communication between the operator and landowners.

17. Will Yellowstone County receive increased tax benefits from the coal mined from beneath it? Will my property taxes be decreased because of the fundamental damage to the value of the property, i. e., fractured bedrock and long term instability. The subsidence is predictable, but how long a piece of property will continue to suffer the affects (sic) of subsidence is not. When the longwall machine is set up in Yellowstone County, will Yellowstone County be able to tax it as long as the machine remains within the county?

Response: The Department discussed the above issues with Musselshell County assessor and Montana Department of Revenue. Gross proceeds taxes will be collected by Musselshell and Yellowstone counties based on the mining activity within each county. Property taxes on the facilities and equipment will be based on its location on the reporting date (January 1 of each year). The lands within the proposed amendment area are currently classified as agricultural; therefore, their assessed value is within the lowest tax category. The landowner may request the county to review the property values following subsidence related damage; however, indications are that this would result in minimal adjustment of the taxes.

BMPII, operator of Bull Mountain Mine No. 1, submitted the following comment on the draft EA. The comment, submitted via e-mail, was received within the defined comment period. The Department's response is also included.

1. BMPII and the Department have agreed that an agreement between BMPII and the owners of the communication towers must be submitted to the Department prior to January 1, 2007. BMPII and the owners of the communication towers, Conocophillips, have been working on said agreement. BMPII is not aware that a protection/mitigation plan is required by the Department or that the plan must be submitted prior to January 1, 2007.

Pursuant to 17.24.911(6), Subsidence Control, of the Administrative Rules of Montana (A.R.M.), if the owner of the structure requests a premining survey, BMPII will survey the structure and devise a plan to protect/mitigate the structures in question. BMPII will be surveying the structure to determine the correlation of the structures location to the underground workings. This survey will be initiated in conjunction with the subsidence survey which must be finished prior to the long wall start up.

Response: Pursuant to ARM 17.24.901(1)(c)(iii), the Department has determined that damage could occur to the structure. In accordance with this rule, BMPII must submit a mitigation plan.

ARM 17.24.911(6) refers to surveys conducted *before* the initiation of operations. The MSUMRA defines operations as encompassing just about everything related to the operation of the mine. BMPII states that the survey must be completed prior to longwall startup; however, the rule requires the survey prior to initiation of operations.

It is within the Department's discretion to stipulate this requirement and that a date be attached to it. It has also been stated by the Department during previous discussions that a protection/mitigation plan for the towers be developed by January 1, 2007. This would allow for sufficient time to review, modify and approve the plan prior to the initiation of the longwall.